

THE PROSPECTS AND CHALLENGES OF SOIL HEALTH CARD SCHEME

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ABSTRACT

Owing to the change in the preferences of crop production techniques over a period of time, several new challenges have drawn attention to the food security. One such improved technology is Integrated Nutrient Management which refers to the maintenance of soil fertility and plant nutrient supply at an optimum level. Lack of one or more nutrients in the soil may cause reduction in the crop yield even though an adequate amount of other nutrients is available. To maintain soil fertility Government of India has launched the Soil Health Card Scheme on 17 February 2015. The main aim behind the scheme was to find out the type of a particular soil and provide ways in which they can improve it. This research aimed to study the awareness level of Soil Health Card Scheme among farmers in study area i.e. Bikaner. It also discussed about the effectiveness of this scheme. This study also undertook the constraints in adoption and implementation of this scheme. This research would provide a way to policy makers to improve the lacunae in the existing scheme and to make the scheme accessible to all the farmers of the country by increasing awareness and eliminating constraints.

KEYWORDS: Constraint, Farmer, Fertiliser, Fertility, Labs, Nutrients, Scheme & Soil

Received: Sep 08, 2018; **Accepted:** Sep 28, 2018; **Published:** Oct 26, 2018; **Paper Id.:** IJASRDEC20183

INTRODUCTION

Food security remains a worldwide concern for the next 50 years and beyond. According to the World Bank projections, the world's population will reach 7.5 billion by 2020. The consequences of population increase are well known to us since we are living in a country where there is a high absolute increase in the number of people. Since there is no much scope for expansion of agricultural land, all the necessary increase in food has to come from the area already under cultivation, which can only happen through introducing the agricultural system and improved technologies to increase productivity contributing not only to more food but also to more income to the farm family. In the process of growing crops, human interventions have altered all agricultural soils from their natural state (Lal, 2007). Due to continuous application and imbalanced use of fertilizers, soil fertility is deteriorating. Soil quality and health change over time due to natural events or human impacts. They are enhanced by management and land-use decisions that weigh the multiple functions of soil and are impaired by decisions which focus only on single functions, such as crop productivity (Doran, 2002). Soils require a certain minimum level of plant-available N and P and other essential nutrients to fulfill the soil functions of food, feed and fibre production. However, a surplus supply of reactive N and P threatens the quality of the soil and results in the emissions of ammonia and N oxides to the air and loss of nitrate and P to water bodies (Velthof *et al.* 2011). Remediation of soil contaminated by heavy metals is necessary in order to reduce the associated risks, make the

land resource available for agricultural production, enhance food security, and scale down land tenure problems (Raymond A. Wayne and Felix E. Okieimen, 2011).

Introduction to Soil Health Card Scheme

The soil health card scheme which was launched by the government on 17 February 2015. This scheme has been promoted by the Department of Agriculture & Co-operation under the Ministry of Agriculture, Government of India and implemented through the Department of Agriculture of all the State and Union Territory Governments (www.india.gov.in). The scheme will monitor the soil of the farmers well and will give them a formatted report. So, they can decide well, which crop they should cultivate and which ones they should skip. The authorities will monitor the soil on a regular basis. One in every three years, they will provide a report to farmers. So Farmers need not to worry if the nature of soil changes due to certain factors. Also, they will always have updated data about their soil. The work of the government does not stop at listing down measures required to improve the quality of soil. In fact, they will employ experts to help farmers in carrying out the corrective measures. Farmers will get a proper soil health record. Also, they can study the soil management practices. Accordingly, they can plan the future of their crop and land. Even if a soil has some limitations they can do something to get the most out of it. The soil health card will give the farmers a proper idea of which nutrients the soil is lacking and hence which crop they should invest in, they will also tell which fertilizer they need. In the process of Soil Health Card Scheme all soil samples had drawn being tested in various soil testing labs across the country. Soil samples should be from a grid of 2.5 ha in irrigated area and 10 ha in rain-fed area with the help of GPS tools and revenue maps. The State Government collects samples through the staff of their Department of Agriculture or through the staff of an outsourced agency. Soil Samples are taken generally two times in a year, after the harvesting of Rabi and Kharif Crop respectively, or when there is no standing crop in the field. A trained person collects soil samples from a depth of 15-20 cm by cutting the soil in a “V” shape. It should be collected from four corners and the centre of the field and mixed thoroughly and a part of this picked up as a sample. Areas with shade should be avoided. The sample chosen will be bagged and coded. It will then be transferred to a soil test laboratory for analysis. The experts will analyze the strength and weaknesses (micro-nutrients deficiency) of the soil and suggest measures to deal with it. The result and suggestion should be displayed in the soil Health Cards. A Soil Health Card is meant to give each farmer, the soil nutrient status of his holding and advise him on the dosage of fertilizers and also the needed soil amendments that he should apply to maintain soil health in the long run. Soil Health Card is a printed report that a farmer will be handed over, for each of the land he holds. It will contain the status of his soil with respect to 12 parameters, namely N, P, K (Macro-nutrients); S (Secondary- nutrient); Zn, Fe, Cu, Mn, Bo (Micro - nutrients); and pH, EC, OC (Physical parameters). Based on this, the Soil Health Card will also indicate fertilizer recommendations and soil amendment required for the farm. The card will contain an advisory based on the soil nutrient status of a farmer’s holding. It will show recommendations on dosage of different nutrients needed.

Introduction to Study Area

Bikaner city is in the northwest of the state of Rajasthan in northern India. It is located 330 kilometres northwest of the state capital, Jaipur. Performance of Bikaner is good in this scheme. In 2016-17, 4.64 lakh samples are collected till November, 2016 in Bikaner. Out of this, only 1.54 lakh samples have been tested and 1.26 lakh cards are issued. Rajasthan has a wide network of Soil Testing Laboratories of 46 static and 12 mobile soil testing labs. Out of these, 32 labs have facilities to test micronutrients. 55 new soil laboratories are being developed and proposed to be operationalized by the end of this financial year. 57445 samples are collected in Bikaner up to 28 March, 2016 out of which 19436 are analysed.

21128 soil health cards have been distributed in the district up to 28 March, 2016.

Objectives

- To study the level of awareness of the Soil Health Card Scheme among the farmers
- To study the effectiveness of the Soil Health Card Scheme
- To study the constraints in adoption and implementation of the Soil Health Card Scheme

RESEARCH METHODOLOGY

Study Area

The entire study was carried out in Bikaner districts of Rajasthan and Hanumangarh during 2017-18.

Collection of Data

Primary Data: Primary data were collected through pre-structured schedule by personal interview with beneficiary farmers, non-beneficiary farmers and soil testing labs.

Secondary Data: Secondary data were collected from government websites, internet, journals, books and magazines.

Research Design

Descriptive research was carried out in this project.

Research Instrument

Separate pre-structured questionnaire was prepared for farmers and soil testing labs consisting of both closed-ended and open-ended questions.

Sampling

The sampling unit consists of farmers and soil testing labs in Bikaner.

Sample Size

Table 1: Total Sample Size

S. No.	Respondents	Number
1	Farmers	80 (20 from each village), 10 are beneficiary and 10 are non-beneficiary
2	Soil testing labs	3

Sampling Procedure

Selection of District: Selected district was Bikaner. Selection of the district was done by Convenient Sampling because the researcher was residing in Bikaner so it was easy for the researcher to collect data from Bikaner.

Selection of Villages: Four villages (Napasar, Akkasar, Bholasar, Gajrupdesar) were selected on the basis of Judgemental Sampling.

Selection of Farmers: 20 per village (10 beneficiaries & 10 non beneficiaries) was selected on the basis of Snowball Sampling because the researcher does not know who are the beneficiary and non-beneficiary farmers in selected villages.

Selection of Soil Testing Labs: All labs of Bikaner were surveyed.

Selection of Crop: Groundnut was selected as a base crop on the basis of Judgemental sampling because the majority of the farmers were groundnut growers in Bikaner.

FINDINGS AND ANALYSIS

Before presenting the results of objectives, the demographic profile of the farmers according to their education level, land holding, and annual income is presented below in the table 2 and 3.

Table 2: Profile of Beneficiary Farmers (N = 40)

Income Status	No. of Respondents	Percentage
Upto 2.5 lakh	3	7
>2.5-5 lakh	7	18
>5-10 lakh	12	30
>10 lakh	18	45
Total	40	100
Education Level of the Farmer	No. of Respondents	Percentage
Illiterate	10	25
Primary	13	32
Secondary	6	15
Senior Secondary	9	23
Graduate & above	2	5
Total	40	100
Land Holding	No. of Respondents	Percentage
Marginal (up to 1 ha)	2	5
Small (>1 to 2 ha)	8	20
Semi-medium (>2 to 4 ha)	8	20
Medium (>4 to 10 ha)	10	25
Large (>10 ha)	12	30
Total	40	100

Source: Primary Data

It can be inferred from table 2 that majority of respondents were having more than 10 lakh income. Only few farmers were having income up to 2.5 lakh. In terms of education, the majority of respondents were having primary education, 25 per cent were illiterate and very few were graduates & above. In terms of land holding, the majority of the respondents were having more than 10 ha land due to which their income was also high and very few farmers were marginal farmers in the sample.

Table 3: Profile of Non-Beneficiary Farmers (N = 40)

Income Status	No. of Respondents	Percentage
2.5 lakh	4	10
>2.5-5 lakh	9	22
>5-10 lakh	6	15
>10 lakh	21	53
Total	40	100
Education Level of the Farmer	No. of Respondents	Percentage
Illiterate	12	30
Primary	10	25
Secondary	14	35
Senior Secondary	3	7
Graduate & above	1	3
Total	40	100

Land Holding	No. of Respondents	Percentage
Marginal (up to 1 ha)	6	15
Small (>1 to 2 ha)	4	10
Semi-medium (>2 to 4 ha)	5	12
Medium (>4 to 10 ha)	8	20
Large (>10 ha)	17	43
Total	40	100

Source: Primary Data

It can be inferred from table 3 that majority of respondents were earning very high income in comparison of others; whereas 10 per cent farmers were having income up to 2.5 lakh. In terms of education, the majority of respondents were secondary educated only 3 per cent were graduates and above. In terms of land, holding most of the farmers were large farmers having more than 10 ha land and only 10 per cent farmers had small land holding.

Level of Awareness of Soil Health Card Scheme among Farmers

The present objective has been categorized under following sub objectives:

- Identification of awareness level among the beneficiary farmers
- Identification of awareness level among the non-beneficiary farmers

Guttman scaling method is used to test the framed questions and on the basis of final cumulative scores of respondents awareness was determined.

Identification of Awareness Level among Beneficiary Farmers

Table 4: Awareness Level among Beneficiary Farmers Regarding Soil Health Card Scheme

	Questions									Total
	A	B	C	D	E	F	G	H	I	
Total	40	17	26	8	8	18	18	19	11	165
Average Awareness										4.125

Table 4 shows the responses of individuals, followed by the final score. “1” indicates awareness while “0” indicates unawareness by the respondent. Taking the cumulative score of respondents agreeing to any parameter, awareness level was calculated. Here all the respondents were aware about the scheme. Person scoring above 6 was considered highly aware while one falling between 6 to 3 was considered to have medium awareness level and one falling in 3 or below was considered less aware. Responses from 40 farmers were collected, out of which 5 farmers got score more than 6, 18 farmers scored between 6 to 3 with average awareness level and rest 17 farmers scored less than or equal to 3 with low awareness level among farmers. So it can be stated that 12 per cent of farmers were highly aware, 45 per cent were having average awareness and rest 43 per cent farmers were having low awareness regarding the Soil Health Card Scheme.

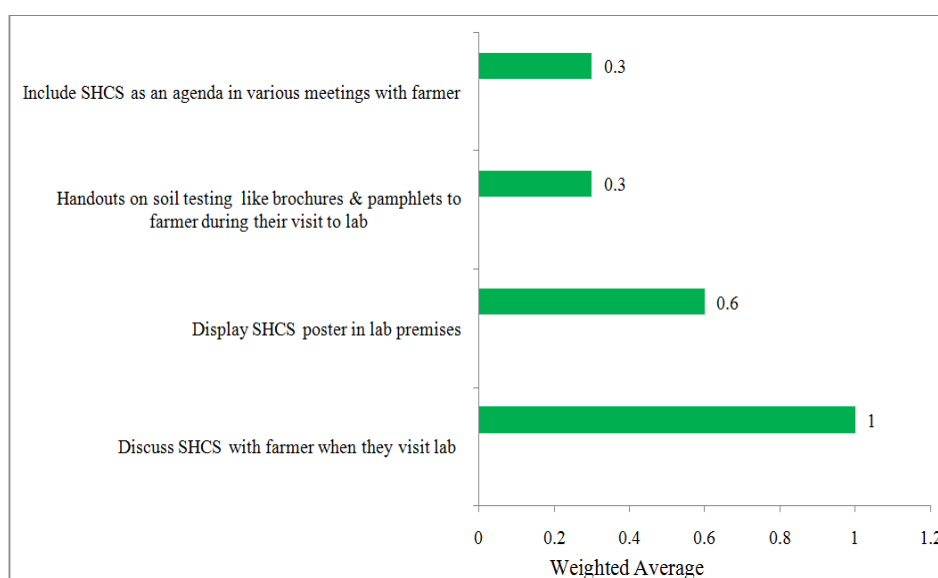
Identification of Awareness Level among Non-Beneficiary Farmers

Table 5: Awareness Level among Non-Beneficiary Farmers Regarding Soil Health Card Scheme

	Questions									Total
	A	B	C	D	E	F	G	H	I	
Total	5	7	5	5	5	7	6	6	3	49
Average Awareness										3.5

Source: Primary Data

Similar procedure as used in table 4 is also followed in the table 5 to check the awareness among non-beneficiary farmers. Here, out of 40 farmers only 14 were aware and rest 26 were not aware. Out of these 14 farmers only 7 per cent farmers were highly aware, 36 per cent farmers were having a medium level of awareness and rest 57 per cent farmers were having low level of awareness. An average awareness level about soil health card scheme among non-beneficiary farmers was 3.5.



Source: Primary Data

Figure 1: Role of Labs in Creating Awareness about Soil Health Card Scheme

From the figure 1 it can be inferred that discussing Soil Health Card Scheme with farmers when they visit lab was the most important role played by soil testing labs in creating awareness about Soil Health Card Scheme. Handouts on soil testing like brochures and pamphlets to farmer during their visit to the labs whereas including Soil Health Card Scheme as an agenda in various meetings with farmer were playing very less role in creating awareness.

Effectiveness of Soil Health Card Scheme

The objective aimed to study the impact of the Soil Health Card Scheme. Effectiveness is studied on the basis of two factors yield and productivity

Effect of Soil Health Card Scheme on yield

Paired Sample 't' Test has done between yield before adoption of the Soil Health Card Scheme and yielded after adoption of the Soil Health Card Scheme.

H_0 – There is no difference between the group means.

H_1 – There is a significant difference between the group means.

Table 6: Paired Samples Statistics for Yield

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Yield A	2073.9500	40	72.11919	11.40304
	Yield B	2303.4750	40	172.21900	27.23021

Source: Primary Data

Table 7: Paired Sample 't' Test for Yield

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Yield A – Yield B	-229.52500	193.28125	30.56045	-291.33934	-167.71066	-7.511	39	.000

Source: Primary Data

Result of Paired t Test for Yield

- Here there is a difference between the group means.
- The above table 7 shows that p value is less than 0.05 so null hypothesis is rejected. It means that there is a significant impact of the Soil Health Card Scheme on yield

Effect of Soil Health Card Scheme on productivity

Paired Sample 't' Test has done between productivity before adoption of the Soil Health Card Scheme and productivity after adoption of the Soil Health Card Scheme.

H_0 – There is no difference between the group means.

H_1 – There is a significant difference between the group means.

Table 8: Paired Samples Statistics for Productivity

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Productivity A	218.8000	40	61.29383	9.69141
	Productivity B	251.0250	40	69.86709	11.04696

Source: Primary Data

Table 9: Paired Sample 't' Test for Productivity

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Productivity A Productivity B	-32.22500	26.48414	4.18751	-40.69504	-23.75496	-7.696	39	.000

Source: Primary Data

Result of Paired t Test for Productivity

- Here there is a difference between the group means.
- The above table 9 shows that p value is less than 0.05 so null hypothesis is rejected. It means that there is a

significant impact of the Soil Health Card Scheme on productivity.

- Here productivity is increasing and productivity is increased when input cost is low and yield is high. So it shows that cost is also reduced.

Constraints in Adoption and Implementation of Soil Health Card Scheme

Present objective is fulfilled for beneficiary, non-beneficiary farmers and soil testing labs respectively under following heads:

- Constraints faced by the non-beneficiary farmers
- Constraints faced by the beneficiary farmers
- Constraints faced by the soil testing labs

Constraints Faced by the Non-Beneficiary Farmers

Table 10: Problems Faced by the Non-Beneficiary Farmers

Factor	Percent Position	Garret Value	Total Score	Mean	Rank
Lack of awareness	91.67	23	2537	63.42	1
Lack of interest	75.00	37	2390	59.75	2
Soil testing not required for my field	58.33	46	1955	48.87	3
Do not know how to take soil samples	8.33	77	1915	47.87	4
Soil testing labs are located far away	41.67	54	1913	47.82	5
Do not know whom to contact	25.00	63	1770	44.25	6

Source: Primary Data

Table 10 depicts that the most prevalent problem was found there was a lack of awareness about Soil Health Card Scheme among non-beneficiary farmers due to which the farmers were not adopting Soil Health Card Scheme. Lack of interest was found the second most prevalent problem faced by the farmers. Farmers had no interest in scheme so they were not adopting the scheme. Some farmers also said that soil testing is not required for my field.

Constraints Faced by Beneficiary Farmers

Table 11: Problems Faced by Beneficiary Farmers

Factor	Percent Position	Garret Value	Total Score	Mean	Rank
Inadequate facilities in labs	58.33	46	2724.00	68.1	1
No proper care of samples	41.67	54	2278.00	56.95	2
Complex procedure	25.00	63	1958.00	48.95	3
Not reliable	8.33	77	1901.00	47.52	4
Waiting period for samples is too long	91.67	23	1814	45.35	5

Source: Primary Data

Table 11 depicts the most important constraint faced by beneficiary farmers was inadequate facilities in soil testing labs like for testing samples, for keeping the samples safely there were no proper facilities. Also, no proper care of samples was taken in the labs. Complex procedure was the constraint faced by beneficiary farmers after adopting Soil Health Card Scheme. Farmers also said that sometimes some extra charges are demanded by the officials.

Constraints Faced by Soil Testing Labs

Table 12: Problems Faced By soil Testing Labs

Factor	Weighted Average	Rank
Less no. of soil testing labs	5	1
Low availability of staff	4.66	2
SHCS is voluntary	4.33	3
Low awareness among farmers	3	4
Less interest of employees	2.33	5
No proper usage of budget	1.66	6

Source: Primary data

Table 12 shows that less no. of soil testing labs was the major problem encountered by the soil testing labs and their availability of staff was also very less which creates hurdle in the implementation and adoption of the Soil Health Card Scheme.

Suggestions Given by Farmers

The suggestions given by the farmers for improvement in the Soil Health Card Scheme were to create proper facilities, making the scheme involuntary for the farmers, improve access of government officials to the farmers, create awareness, central government should move to direct cash transfers and reduce wasting time.

The Suggestions Given by Soil Testing Labs

Increase availability of staff and no. of soil testing labs, soil health card must be attached with Aadhar card and it should begin under nation-wide drive, exploitation of the subsidy must be reduced, soil testing must be included in the syllabus of science practical at the senior secondary level were some suggestion given by the soil testing labs for proper implementation of Soil Health Card Scheme.

CONCLUSIONS

In the light of the findings of the project entitled “Prospects and Challenges of Soil Health Card Scheme” it can be concluded that this is a very good scheme launched by the Government of India for the farmers for maintaining soil fertility and improving soil health but its implementation needs much concern. Due to lack of awareness it is not widely accessible to the farmers. They do not know the benefits of this scheme so they are not adopting it, but soil testing labs are playing appreciable role in creating awareness about this scheme. This scheme is not only helpful in maintaining soil fertility, but it is also effective in terms of yield and productivity. The farmers who have adopted this scheme get the increase in yield and productivity of their crops. But still there are some constraints in adoption and implementation of this scheme. According to the non-beneficiary farmer’s lack of awareness, lack of interest, know how for taking samples, distance from soil testing labs etc. are some problems which are creating hurdles in the adoption of this scheme. Some farmers are facing problems after adoption of his scheme. Some problems are also encountered by soil testing labs like low availability of staff; less no. of soil testing labs, Soil Health Card Scheme is voluntary, no proper usage of budget, less interest of employees and low awareness among farmers. This scheme can be more effective if more stress be given in creating awareness and improving its constraints. So it could be concluded that this study can provide a way to policy makers to improve this scheme so that it can benefit the farmers in the most effective way.

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